

SWITCHABLE LIGHTNING ARRESTER SYSTEM

BACKGROUND OF THE INVENTION

This invention relates to switchable contact of lightning arresters to power lines on power poles and on or near transformers.

5 Currently, the most commonly used lightning arresters on power poles and on or near transformers are not designed to continue to operate repeatedly after nearly all lightning strikes, but to be sacrificial with designedly predetermined self-destruction from lightning electrical surges in excess of design amounts which are most typically 10 KV.

10 After sacrificial self-destruction, the lightning arresters must be replaced promptly at high risk by line workers. The high risk results from not shutting down power lines to a self-destructed lightning arrester while line workers electrically connect a replacement lightning arrester to a power line in order to avoid interruption of electrical service to residential and commercial power users and in
15 order to save high power-plant costs. For initial installation of lightning arresters, power to power lines and transformers can be delayed until the lightning arresters are installed. Shutdown of a power line is expensive and time consuming for single and separate replacement of lightning arresters because (a) high power-plant-employee costs in addition to power-line workers are required and (b) shutdown for
20 a single power line or transformer often requires shutdown of branched power lines to a plurality of users. Accordingly, power-line workers are often under employment pressure to avoid injury-preventive shutdowns for replacing single lightning arresters. Generally, the replacement can be accomplished safely, but serious injury and death of line workers result frequently from unexpected electrical surges and

from accidental occurrences during replacement and electrical-line contact of the lightning arresters without safety shutdowns.

There is no known switchable lightning-arrester system for allowing replacement of lightning arresters with safe electrical connection to a power line
5 without interrupting electrical service and without expensive power-plant shutdown of power in a manner taught by this invention.

Examples of most-closely related known but different devices are described in the following patent documents:

	<u>U.S. Patent No.</u>	<u>Inventor</u>	<u>Issue Date</u>
10	2,296,991	Fox	09-29-1942
	3,614,700	Beard, <i>et al.</i>	10-19-1971
	3,497,148	MacDonald	08-07-1990
	4,688,013	Nishikawa	08-18-1987
	4,546,341	McNaghten, <i>et al.</i>	10-08-1985
15	4,795,996	Brown, <i>et al.</i>	01-03-1989
	4,814,550	Newberg	03-21-1989
	4,450,425	Manning	05-22-1984

SUMMARY OF THE INVENTION

Objects of patentable novelty and utility taught by this invention are to provide
20 safe, quick, convenient and inexpensive line work and replacement of lightning arresters following lightning damage; and

to provide optional utilization or non-utilization of conventional power-line structure and technology of lightning arresters with the safety-switchable lightning-arrester system.

25 This invention accomplishes these and other objectives with a switchable lightning-arrester system having a safety-switchable connector which can include a

counter-lever safety connector, a slide safety connector, a hinged safety connector or a pivot safety connector intermediate a power line and a lightning arrester for on-spot disconnection to protect workers from self-destructing arresters when changing lightning arresters or working on damaged lines without costly, time-consuming and power-disruptive shutdown of power lines. This is highly important because the lightning arresters are changed and repair work is done on damaged lines as quickly after self-destruction from lightning surges as possible when lightning storms are very likely to still exist in the area requiring the change and repair. The safety-switchable connectors are made to be operable and changeable from a safe distance remotely, which is preferably from a ground position near a light pole, a transformer or other line support. Many line-worker lives have been lost in the past without this safety-switchable connector.

The above and other objects, features and advantages of the present invention should become even more readily apparent to those skilled in the art upon a reading of the following detailed description in conjunction with the drawings wherein there is shown and described illustrative embodiments of the invention.

BRIEF DESCRIPTION OF DRAWINGS

This invention is described by appended claims in relation to description of a preferred embodiment with reference to the following drawings which are explained briefly as follows:

FIG. 1 is a partially cutaway side elevation view of a closed mode of a counter-lever embodiment of the switchable lightning-arrester system having a counter-lever safety switch and mounted on an arrester-attachment base for

attachment to a power-line support that can include transformers and light posts and for operation from an attachment side;

5 **FIG. 2** is a partially cutaway side elevation view of the counter-lever embodiment mounted on the attachment base for operation from a different side than the attachment side;

FIG. 3 is a partially cutaway side elevation view of a top portion of the counter-lever embodiment in an open mode;

FIG. 4 is a side view of an open-lock pin;

10 **FIG. 5** is a partially cutaway side elevation view of the counter-lever embodiment for use of a remote actuator that includes a contraction-force spring;

FIG. 6 is a partially cutaway side elevation view of the counter-lever embodiment for use of a remote actuator that includes a remote-control motor having a linear-actuation bar;

15 **FIG. 7** is a partially cutaway side elevation view of a top portion of the counter-lever embodiment for optionally hand or remote-tool operation;

FIG. 8 is a partially cutaway side elevation view of a top portion of the counter-lever embodiment for optionally hand or remote-electrical operation and being in a closed mode;

20 **FIG. 9** is a partially cutaway side elevation view of a closed mode of an embodiment of the switchable lightning-arrester system having a slide safety switch with a connection insert that is opened and closed from a lever side of a slide connector;

FIG. 10 is a partially cutaway side elevation view of an open mode of the **FIG. 9** illustration;

FIG. 11 is a partially cutaway side elevation view of a closed mode of an embodiment of the switchable lightning-arrester system having a slide safety switch with a connection insert that is opened and closed from opposite a lever side of the slide connector;

5 **FIG. 12** is a partially cutaway side elevation view of an open mode of the **FIG. 11** illustration;

FIG. 13 is a partially cutaway side elevation view of a closed mode of the **FIG. 11** illustration with the control lever being on an opposite of the lightning arrester and with the control lever pivotal upwardly to the closed mode;

10 **FIG. 14** is a partially cutaway side elevation view of a closed mode of an embodiment of the switchable lightning-arrester system having a hinged safety switch on a hinge rod in a hinge bay;

FIG. 15 is a partially cutaway side elevation view of the **FIG. 14** illustration; having a support connector for connecting an arrester-attachment base to a line-
15 support platform independently of a power-line support or pole;

FIG. 16 is a partially cutaway front elevation view of the **FIG. 14** illustration;

FIG. 17 is a partially cutaway side elevation view of an open mode of the switchable lightning-arrester system having the hinged safety switch on a hinge rod
20 removed from the hinge bay for being either removed for discard by downward travel or replaced and closed by upward travel;

FIG. 18 is a top view of the **FIG. 16** illustration;

FIG. 19 is a bottom view of the **FIG. 16** illustration;

FIG. 20 is a partially cutaway side elevation view of a closed mode of a pivot-
25 connector embodiment with a pivot axle on an arrester side of a pivotal connection;

FIG. 21 is a partially cutaway side elevation view of an open mode of the **FIG. 20** illustration;

FIG. 22 is a partially cutaway front elevation view of the **FIG. 20** illustration;

FIG. 23 is a top view of the **FIG. 20** illustration;

5 **FIG. 24** is a partially cutaway side elevation view of a closed mode of the pivot-connector embodiment with the pivot axle on a line side of the pivotal connection; and

FIG. 25 is a partially cutaway fragmentary side view of a top portion of an open mode of the **FIG. 24** illustration.

DESCRIPTION OF PREFERRED EMBODIMENT

Listed numerically below with reference to the drawings are terms used to describe features of this invention. These terms and numbers assigned to them designate the same features throughout this description.

- | | | |
|----|---------------------------------|----------------------------------|
| 5 | 1. Lightning arrester | 40. Slide safety switch |
| | 2. Base end | 41. Slide platform |
| | 3. Power-line end | 42. Slide-fulcrum pillar |
| | 4. Link bolt | 43. Slide pillar |
| | 5. Arrester fins | 44. Line-support platform |
| 10 | 6. Ground end | 45. Slide aperture |
| | 7. Terminal end | 46. Slide rod |
| | 8. Arrester-attachment base | 47. Connection insert |
| | 9. Power-line support | 48. Slide-rod axle |
| | 10. Safety-switchable connector | 49. Lever-link rod |
| 15 | 11. Power line | 50. Lever-link axle |
| | 12. Ground-line connector | 51. Connector-side pillar groove |
| | 13. Ground line | 52. Lever-side pillar groove |
| | 14. Counter-lever safety switch | 53. Slide groove |
| | 15. Switch platform | 54. Pillar stop |
| 20 | 16. Fulcrum pillar | 55. Lever stop |
| | 17. Pillar end | 56. Hinged safety switch |
| | 18. Line-support arm | 57. Hinge rod |
| | 19. Support-arm axle | 58. Hinge bay |
| | 20. Switch-rod end | 59. Bifurcation arms |
| 25 | 21. Power-line clamp | 60. Handle base |
| | 22. Switch rod | 61. Latch knob |
| | 23. Control lever | 62. Spring latch |
| | 24. Control-lever handle | 63. Latch stop connector |
| | 25. Control-lever axle | 64. Arcuate guides |
| 30 | 26. Control-link rod | 65. Hinge-rod base |
| | 27. First link-rod end | 66. Support connector |
| | 28. First link axle | 67. Pivot safety switch |
| | 29. Second link-rod end | 68. Connector base |
| | 30. Second link axle | 69. First connector boss |
| 35 | 31. Open-lock aperture | 70. Second connector boss |
| | 32. Open-lock pin | 71. Connector plug |
| | 33. Contraction-force spring | 72. Pivot member |
| | 34. Pin ring | 73. Pivot axle |
| | 35. Remote-control motor | 74. Tapered sides |
| 40 | 36. Linear-actuation bar | 75. Tapered ends |
| | 37. Wrench socket | 76. Support pillar |
| | 38. Hand knob | |
| | 39. Electrical socket | |

Referring to **FIGS. 1-8**, the switchable lightning-arrester system can include counter-lever-switchable connection with a lightning arrester **1** having a base end **2**, a power-line end **3** and a link bolt **4** positioned internally from arrester fins **5**. The link bolt **4** has a ground end **6** proximate the base end **2** and a terminal end **7** proximate the power-line end **3**. An arrester-attachment base **8** is provided for receiving the base end **2** of the lightning arrester **1** for attaching the lightning arrester **1** to a power-line support **9**.

A safety-switchable connector **10** proximate the power-line end **3** of the line bolt **4** is articulated for open and closed switching of electrical communication from a power line **11** to the link bolt **4** and to a ground-line connector **12** proximate the ground end **6** of the link bolt **4** for connecting a ground line **13** to the line bolt **4**.

The safety-switchable connector **10** can include a counter-lever safety switch **14** having a switch platform **15** to which the terminal end **7** of the link bolt **4** is attached. A fulcrum pillar **16** is extended vertically upward from a pillar end **17** of the switch platform **15**. A line-support arm **18** is attached pivotally to a support-arm axle **19** proximate a top of the fulcrum pillar **16**. The line-support arm **18** is extended from proximate the support-lever axle **19** to a switch-rod end **20**.

A power-line clamp **21** on the switch-rod end **20** is positioned vertically above the link bolt **4** in a closed mode of the counter-lever safety switch **14**. A switch rod **22** is extended downward vertically from the line-support arm **18** for contacting the terminal end **7** of the link bolt **4** in a closed mode of the counter-lever safety switch **14**. The support-arm axle **19** is positioned horizontally on the fulcrum pillar **16** at a control-fulcrum distance upwardly from the switch platform **15**.

A control lever **23** having a control-lever handle **24** is attached pivotally to the fulcrum pillar **16** with a control-lever axle **25**. A control-link rod **26** has a first link-

rod end 27 attached pivotally to the line-support arm 18 with a first link axle 28. The control-link rod 26 has a second link-rod end 29 attached pivotally to the control lever 23 with a second link axle 30.

5 The control-link rod 26 is articulated and positioned intermediate the line-support arm 18 and the control lever 23 for transmitting downwardly locking force on the line-support arm 18 from downward travel of the control lever 23 and for transmitting upwardly unlocking force on the line-support arm 18 from upward travel of the control lever 23 as transmitted to the control-lever handle 24 selectively. The control-link rod 26 transmits a lock-shut mode of the counter-lever
10 safety switch 14 with the switch rod 22 being in contact with the terminal end 7 of link bolt 4 by positioning of the first link axle 28, the second link axle 30 and the control-lever axle 25 in a straight line for transmitting lightning power to the ground line 13 for a use mode of the lightning arrester 1.

The control-lever handle 24 can be articulated for hand-grasping and for
15 selectively remote grasping with a control rod.

The support-arm axle 19 is positioned a predetermined distance in a direction away from the pillar end 17 of the switch platform 15 for causing a predetermined central-actuation slant of the control lever 23, below which opening of the counter-lever safety switch 14 with upward travel of the switch rod 22 is prevented by
20 offsetting leverage.

An open-lock aperture 31 is articulated and positioned in the control lever 23 for receiving an open-lock pin 32 for preventing downward travel of the control-link rod 26 and thereby preventing unintended downward actuation of the control lever 23.

The counter-lever safety switch **14** can include a remote actuator intermediate the fulcrum pillar **16** and the control lever **23** for remote actuation of the control lever **23** predeterminedly.

5 The remote actuator can include a contraction-force spring **33** in combination with the open-lock aperture **31** that is articulated and positioned in the control lever **23** for receiving the open-lock pin **32** for preventing downward travel of the control-link rod **26** and thereby preventing unintended downward actuation of the control lever **23** by the contraction-force spring **33**.

The open-lock pin **32** can include a remotely accessible pin ring **34**.

10 The remote actuator can include a remote-control motor **35** having a linear-actuation bar **36** extended from the remote-control motor **35** to pivotal contact with the control lever **23** for actuating the linear-actuation bar **36** outwardly in a direction away from the fulcrum pillar **16** for opening and inwardly in a direction towards the fulcrum pillar **16** for closing the counter-lever safety switch **14**.

15 The remote-control motor **35** can include a wrench socket **37** for rotation with a socket wrench.

The remote-control motor **35** can include a hand knob **38** for hand rotation.

The remote-control motor **35** can include an electrical socket **39** for receiving electrical current.

20 Referring to **FIGS. 9-13**, the switchable lightning-arrester system can include slide-switchable connection with the lightning arrester **1** having the base end **2**, the power-line end **3** and the link bolt **4** positioned internally from arrester fins **5** of the lightning arrester **1**. The link bolt **4** has the ground end **6** proximate the base end **2** and the terminal end **7** proximate the power-line end **3**. The arrester-attachment

base **8** receives the base end **2** of the lightning arrester **1** for attaching the lightning arrester **1** to the power-line support **9**.

The safety-switchable connector **10** proximate the power-line end **3** of the link bolt **4** for open and closed switching of electrical communication from the power line **11** to the link bolt **4** can include a slide safety switch **40** having a slide platform **41** to which the terminal end **7** of the link bolt **4** is attached detachably. Included also can be the ground-line connector **12** proximate the ground end **6** of the link bolt **4** for connecting the ground line **13** to the link bolt **4**.

The slide-fulcrum pillar **42** is extended vertically upward from a pillar end of the slide platform **41**. A slide pillar **43** is extended vertically upward from the slide platform **41** intermediate the slide-fulcrum pillar **42** and the link bolt **4**. A line-support platform **44** is attached pivotally to a top of the slide pillar **43**. The power-line clamp **21** is attached to a top of a line-support platform **44** with the switch rod **22** for holding the power line **11**.

The slide pillar **43** has a slide aperture **45** for receiving a slide rod **46** having a connection insert **47** on a first end and a slide-rod axle **48** on a second end.

The connection insert **47** is articulated to contact a bottom end of the switch rod **22** and the terminal end **7** of the link bolt **4** for conveying lightning current to the lightning arrester **1**.

A lever-link rod **49** is positioned intermediate the slide rod **46** and the control lever **23** with a first end of the lever-link rod **49** attached pivotally to the slide-rod axle **48** and a second end of the lever-link rod **49** attached pivotally to the control lever **23** with a lever-link axle **50**;

The control lever **23** is attached pivotally to the slide-fulcrum pillar **42** with the control-lever axle **25**.

The switch rod **22** is extended downward vertically from the line-support platform **44** for contacting the connection insert **47** with the slide safety switch **40** being in a closed-circuit mode with the control lever **23** oriented pivotally for sliding the slide rod **46** in opposite directions selectively.

5 The control-lever axle **25** is positioned predeterminedly above the slide platform **41** for allowing the control-lever **23** to be pivoted with the control-lever handle **24** being raised above a horizontal attitude of the control lever **23** for sliding the slide rod **46** and thereby moving the connection insert **47** out of contact with the terminal end **7** and the switch rod **22** for breaking circuitry of the counter-lever
10 safety switch **14** or optionally with the control-lever handle **24** being lowered below the horizontal attitude of the control lever **23** for sliding the slide rod **46** and thereby moving the connection insert **47** out of contact with the terminal end **7** and the switch rod **22** for breaking circuitry of the counter-lever safety switch **14** with the lever-link rod **49** having a double-end pivotal contact with the slide rod **46** and the
15 control lever **23**.

As shown in **FIGS. 9-10**, the slide rod **46** can include an inwardly opening length for positioning the connection insert **47** in a closed mode of the counter-lever safety switch **14** with the connection insert **47** in electrical communication with the terminal end **7** and the switch rod **22** by positioning of the control lever **23** and the
20 lever-link rod **49** collinearly in line and for positioning the connection insert **47** inwardly towards the slide pillar **43** by optionally upward or downward pivoting of the control lever **23**.

As shown in **FIGS. 11-13**, the slide rod **46** can include an outwardly opening length for positioning the connection insert **47** in a closed mode of the counter-lever
25 safety switch **14** with the connection insert **47** in electrical communication with the

terminal end 7 and the switch rod 22 by positioning of the control lever 23 and the lever-link rod 49 collinearly in line and for positioning the connection insert 47 outwardly in an opposite direction from the slide pillar 43 by optionally upward or downward pivoting of the control lever 23.

5 For controlling sliding travel of the slide rod 46, the switchable lightning-arrester system can further comprise a connector-side pillar groove 51 positioned circumferentially in an inside perimeter of the slide aperture 45 proximate a connector side of the slide pillar 43. A lever-side pillar groove 52 is positioned circumferentially in an inside perimeter of the slide aperture 45 proximate a lever
10 side of the slide pillar 43 and a slide groove 53 is positioned in an outside periphery of the slide rod 46.

The slide groove 53 is articulated to receive a major cross-sectional portion of a toroidal resilient washer. The connector-side pillar groove 51 is articulated to receive a remaining minor cross-sectional portion of the toroidal resilient washer and
15 the lever-side pillar groove 52 is articulated to receive the remaining minor cross-sectional portion of the toroidal resilient washer for restraining travel of the slide rod 46 from optionally open and closed modes of the counter-lever safety switch 14.

The switchable lightning-arrester system can further comprise a pillar stop 54 on the slide-fulcrum pillar 42 articulated and positioned for arresting downward
20 travel of the control lever 23.

The switchable lightning-arrester system can further comprise a lever stop 55 on the control lever 23 that is articulated and positioned for arresting downward travel of the control lever 23.

Referring to FIGS. 14-19, for hinge-connection switching, the switchable
25 lightning-arrester system can comprise the lightning arrester 1 having the base end

2, the power-line end 3 and the link bolt 4 positioned internally from arrester fins 5 of the lightning arrester 1. The link bolt 4 has the ground end 6 proximate the base end 2 and the terminal end 7 proximate the power-line end 3. The arrester-attachment base 8 is articulated for receiving the base end 2 of the lightning arrester 1 predeterminedly for attaching the lightning arrester 1 to the power-line support 9. The safety-switchable connector 10 is positioned proximate the power-line end 3 of the link bolt 4 for open and closed switching of electrical communication from the power line 11 to the link bolt 4. The safety-switchable connector 10 for this embodiment includes a hinged safety switch 56 having a hinge rod 57 proximate the base end 2 of the lightning arrester 1. The hinge rod 57 is positioned in a hinge bay 58 on the arrester-attachment base 8 for pivoting the lightning arrester 1 orthogonally to an axis of the hinge rod 57. The lightning arrester 1 is pivotal interchangeably between a closed mode of the hinged safety switch 56 with the terminal end 7 of the link bolt 4 in electrical communication with the switch rod 22 and an open mode of the hinged safety switch 56 with the terminal end 7 of the link bolt 4 being removed pivotally from the electrical communication with the switch rod 22.

The ground-line connector 12 proximate the ground end 6 of the link bolt 4 is articulated for connecting a ground line 13 to the link bolt 4.

The hinge bay 58 is bifurcated in bifurcation arms 59 extended from the arrester-attachment base 8. The terminal end 7 of the link bolt 4 is positioned in a handle base 60 from which the control lever 23 having the control-lever handle 24 is extended laterally for positioning the hinge rod 57 in and out of the hinge bay 58 and for pivoting the lightning arrester 1 to and from a closed mode of the hinged safety switch 56. The terminal end 7 can include a latch knob 61 that is latched with

a spring latch 62 that is extended laterally from a latch stop connector 63 that is in electrical communication with the switch rod 22 for communicating lightning current from the power line 11, through the switch rod 22, through the spring latch 62 and into the terminal end 7 of the link bolt 4. The latch stop connector 63 stops pivotal travel of the lightning arrester 1 beyond a position of electrical connection of the latch knob 61 with the spring latch 62.

The bifurcation arms 59 can include arcuate guides 64 for guiding a portion of the lightning arrester 1 containing the hinge rod 57 between the bifurcation arms 59 while the hinged safety switch 56 is being opened and closed with the control lever 23.

The base end 2 of the lightning arrester 1 has an attachable hinge-rod base 65 from which the hinge rods 57 are extended from opposite sides.

The hinged safety switch 56 can include a support connector 66 extended intermediate the arrester-attachment base 8 and the line-support platform 44.

Referring to FIGS. 20-25, for a pivotal connection, the switchable lightning-arrester system can include the lightning arrester 1 having the base end 2, the power-line end 3 and the link bolt 4 positioned internally from arrester fins 5 of the lightning arrester 1. The link bolt 4 has the ground end 6 proximate the base end 2 and the terminal end 7 proximate the power-line end 3. The arrester-attachment base 8 receives the base end 2 of the lightning arrester 1 predeterminedly for attaching the lightning arrester 1 to the power-line support 9. The safety-switchable connector 10 proximate the power-line end 3 of the link bolt 4 for open and closed switching of electrical communication from the power line 11 to the link bolt 4 includes a pivot safety switch 67 positioned on the power-line end 3 of the lightning arrester 1.

The pivot safety switch **67** has a connector base **68** that is attached detachably to the power-line end **3** of the lightning arrester **1**. A support pillar **76** is extended orthogonally from the connector base **68** to the line-support platform **44**.

5 A first connector boss **69** is extended predeterminedly from the connector base **68** in a direction towards the line-support platform **44**. A second connector boss **70** is extended predeterminedly from the line-support platform **44** in a direction towards the connector base **68**. A connector plug **71** is positioned removably in electrical communication with the first connector boss **69** and the second connector boss **70**. The connector plug **71** is affixed to a pivot member **72** that is pivotal from a pivot
10 axle **73** on a predetermined side of the first connector boss **69** and the second connector boss **70** for pivoting the connector plug **71** into and out from electrical communication with the first connector boss **69** and the second connector boss **70** selectively.

The first connector boss **69** is in electrical communication with the terminal
15 end **7** of the link bolt **4**. The second connector boss **69** is in electrical connection with the switch rod **22** for electrical communication with the power line **11**.

As shown in **FIGS. 20-21**, the predetermined side of the first connector boss **69** and the second connector boss **70** on which the pivot member **72** is positioned can include a connector-base side with the pivot axle **73** positioned on the connector base
20 **68** for pivoting the pivot member **72** in a direction towards the lightning arrester **1** for removing the connector plug **71** from intermediate the first connector boss **69** and the second connector boss **70**.

As shown in **FIGS. 24-25**, the predetermined side of the first connector boss **69** and the second connector boss **70** on which the pivot member **72** is positioned can
25 include a line side with the pivot axle **73** positioned on the line-support platform **44**

for pivoting the pivot member **72** in a direction opposite from the lightning arrester **1** for removing the connector plug **71** from intermediate the first connector boss **69** and the second connector boss **70**.

5 The pivot axle **73** is preferably but need not be in line with the an axis of the link bolt **4** and the switch rod **22**. Being in line makes a better contact of the connector plug **71** with the first connector boss **69** and the second connector boss **70**.

The connector plug **71** can include tapered sides **74** and the first connector boss **69** and the second connector boss **70** include tapered ends **75** that match taper of the tapered sides **74**.

10 The pivot member **72** can include the control lever **23**.

Referring further to **FIGS. 20-25**, the switchable lightning-arrester system can have the pivot safety switch **67** being attachable detachably to the terminal end **7** of the link bolt **4** proximate the power-line end **3** of the lightning arrester **1**. The pivot safety switch **67** has the connector base **68** that is attached detachably to the power-
15 line end **3** of the lightning arrester **1**. The support pillar **76** is extended orthogonally from the connector base **68** to the line-support platform **44**. The first connector boss **69** is extended predeterminedly from the connector base **68** in the direction towards the line-support platform **44**. The second connector boss **70** is extended predeterminedly from the line-support platform **44** in the direction towards the
20 connector base **68**. The connector plug **71** is positioned removably in electrical communication with the first connector boss **69** and the second connector boss **70**. The connector plug **71** is affixed to the pivot member **72** that is pivotal from the pivot axle **73** on a predetermined side of the first connector boss **69** and the second connector boss **70** for pivoting the connector plug **71** into and out from electrical
25 communication with the first connector boss **69** and the second connector boss **70**

selectively. The first connector boss **69** is in electrical communication with the terminal end **7** of the link bolt **4** and the second connector boss **69** is in electrical connection with the switch rod **22** for electrical communication with the power line **11**.

5 As shown in **FIGS. 20-21**, the predetermined side of the first connector boss **69** and the second connector boss **70** on which the pivot member **72** is positioned can include the connector-base side with the pivot axle **73** positioned on the connector base **68** for pivoting the pivot member **72** in the direction towards the lightning arrester **1** for removing the connector plug **71** from intermediate the first connector
10 boss **69** and the second connector boss **70**.

As shown in **FIGS. 25-25**, the predetermined side of the first connector boss **69** and the second connector boss **70** on which the pivot member **72** is positioned can include the line side with the pivot axle **73** positioned on the line-support platform **44** for pivoting the pivot member **72** in the direction opposite from the lightning
15 arrester **1** for removing the connector plug **71** from intermediate the first connector boss **69** and the second connector boss **70**.

The pivot axle **73** is preferably but not necessarily in line with the an axis of the link bolt **4** and the switch rod **22** of the lightning arrester **1** to which the pivot safety switch **67** is attachable.

20 The connector plug **71** can include tapered sides **74** in combination with the first connector boss **69** and the second connector boss **70** which include tapered ends **75** that match taper of the tapered sides **74**. The pivot member **72** can include the control lever **23**.